

# **Measuring Broadband America Program's Mobile Measurement**

## **Privacy Policy and Implementation Review Document (Draft)**

The Federal Communications Commission is expanding the Measuring Broadband America program to include the measurement of broadband coverage and performance on mobile devices.

This document describes the Measuring Broadband America program's mobile measurement project's privacy policy issues and concerns. Although detailed discussion of the testing architecture are beyond the scope of this document, we briefly describe the sources and varieties of measurement data available from the measurement architecture to establish a starting point for developing appropriate privacy policies.

The FCC developed privacy policies for the fixed Measuring Broadband America program to address privacy concerns associated with the public release of raw, unaggregated data from volunteers collected at the subscriber's Census Block Group ID level. For the mobile broadband measurement program, we anticipate collecting performance information at an equivalent or more detailed level of geographic precision. The highly variable nature of mobile broadband use raises additional potential privacy concerns to be addressed by the privacy working group. The objective of this privacy review project is to ensure that the process for data collection supports overall concerns for consumer privacy and aligns with a formal privacy policy.

The product of this policy review will support:

- Development of a Privacy Policy for all stakeholders integral to the data collection process that reflects government and industry best practices;
- Development of a mobile MBA program Terms and Conditions to be agreed to by each mobile subscriber volunteer at the time of download, based on the Terms and Conditions used in the fixed program;
- Drafting of a Code of Conduct, to be signed by all mobile program stakeholders, based on the 2012 Code of Conduct used in the fixed MBA program;
- Development of specifications defining the nature of data to be collected and the manner it may be gathered from mobile handsets;
- Adoption of policies for aggregation and masking of data for sample sizes that may permit identification or other information related to individual mobile handsets; and
- Establishment of privacy policies for consumer notification, data collection, data processing and data release.

### **Sources of Measurement Data**

The nature of data that can be collected from the mobile MBA measurement architecture defines the scope of policy use cases and potential risks and concerns. Below three sources of data are described and the kind of data that can be collected from each source is enumerated.

### *Handset Characteristics*

The handset Operating System (OS) application programming interfaces (API) permit the gathering of a variety of information about the hardware and software available on the device. The amount of memory and computing resources may be relevant to evaluating the potential impact of a device's resource limitations on broadband performance. The OS, network stack, or other software versions are easily queried, and information, including the type and configuration of the handset, characteristics of the radio network supporting the handset, as well as performance data from tests scheduled by the MBA client software operating on the device, could significantly improve the analysis of broadband performance data. Data to be potentially collected includes:

- Android OS Version
- Installed Memory
- Hardware CPU model and speed
- Software Instance Identifier

### *Network Information*

The handset can also be queried for information on the characteristics of the supporting broadband cellular network infrastructure. Data to be potentially collected includes:

- Location of device (GPS)
- Connection state to a data network
- Active cell tower ID and signal strength (*RSSI*)
- Signal/Interference Level ( *Ec/Io*)
- Visible neighboring cell towers, including cell IDs and *RSSI*
- Active network operator ID ("MNC") and name
- Active network country code ("MCC") and name
- SIM's network operator ID and name
- SIM's network country code and name
- Bearer (CDMA, GPRS, EDGE, all of the 3G variants, LTE, etc.)
- Phone type (GSM, CDMA)
- Roaming state

### *Internet Protocol Active Measurements*

Finally, MBA client software installed on the consumer handset is capable of periodically performing performance tests. These can include:

- UDP Latency and Packet Loss
- ICMP Latency and Packet Loss
- Upload Speed
- Download Speed
- Web Page Loading
- Video Streaming Performance
- VoIP Performance
- DNS Resolution Speed

## Policy Use Cases and Implementation Concerns

The matrix below illustrates various data collection use cases.<sup>1</sup>

Objectives associated with the MBA program include:

1. Ensuring the release of any data or computed result consistent with an established privacy policy.
2. Releasing test results and reports on mobile networks and performance of interest to consumers, policy makers and research institutions.
3. Releasing all data used to calculate test results and produce reports.
4. Consistent with the objectives above, releasing all data otherwise collected.

Adherence to privacy objectives may require transformation of some data elements to maintain individual privacy. This can include:

- Aggregation of data to a level sufficient to address privacy concerns; aggregation may occur at handset where appropriate.
- Partitioning of data to de-correlate certain elements.
- Avoiding collection of data elements linked to privacy concerns.
- Other methods as appropriate.

Data, at the most granular level, would generally be collected from a consumer handset in a format such as:

{Metric1, Metric2, ....}, lat/lon, celltowerid, cellphonetype, servicecompany, infrastructurecompany, timestamp, service, IPaddress, IMSI/IMEI

Collected data may need to be processed as discussed before release to support privacy policy.

Each policy use case below, as well as the minimum data elements required to satisfy the use case, will be defined prior to the launch of measurement, to ensure that adherence to the defined privacy policy is maintained.

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<sup>1</sup> This list is draft only and may not be complete.

<b>Policy Use Case</b>	<b>Needed Data Element<sup>2</sup></b>	<b>Risks and Concerns</b>
RF strength in a geographic block <sup>3</sup> by: <ul style="list-style-type: none"> <li>• service provider</li> <li>• service type</li> <li>• phone type</li> <li>• time period</li> </ul>	Signal strength averaged across time period within a geographic block.  Data elements: <ul style="list-style-type: none"> <li>• Signal strength</li> <li>• lat/long</li> <li>• cell tower ID</li> <li>• cell phone type</li> <li>• service company</li> <li>• infrastructure company</li> <li>• time stamp</li> <li>• service</li> </ul>	Mobile test unit data correlated with performance data across time could expose geographic path of the device or permit uniquely identifying device.  Row level statistics of individual users may reveal patterns of use in time periods of raw test results.
RF S/N in a geographic block by: <ul style="list-style-type: none"> <li>• service provider</li> <li>• service type</li> <li>• time period</li> <li>• phone type</li> </ul>	Signal to noise ratio averaged across time period within a geographic block.  Data elements: <ul style="list-style-type: none"> <li>• RF S/N</li> <li>• lat/long,</li> <li>• cell tower ID</li> <li>• cell phone type</li> <li>• Service company</li> <li>• infrastructure company</li> <li>• time stamp</li> <li>• service</li> </ul>	Mobile test unit data correlated with performance data across time could expose geographic path of the device or permit uniquely identifying device.  Row level statistics of individual users may reveal patterns of use in time periods of raw test results.
Average speed in a geographic block by: <ul style="list-style-type: none"> <li>• service provider</li> <li>• service type</li> <li>• time period</li> <li>• phone type</li> </ul>	Speed averaged across time period within a geographic block.  Data elements: <ul style="list-style-type: none"> <li>• IP performance speed metric</li> <li>• cell tower ID</li> <li>• cell phone type</li> <li>• service company</li> </ul>	Mobile test unit data correlated with performance data across time could expose geographic path of the device or permit uniquely identifying device.  Row level statistics of individual users may reveal patterns of use in time periods of raw test results.

<sup>2</sup> Elements indicated may or may not be collected, subject to privacy policy.

<sup>3</sup> Geographic Block is a to- be- determined geographic area of possibly varying size, the set of which covers the U.S., chosen to aggregate data at a level necessary to satisfy privacy concerns.

	<ul style="list-style-type: none"> <li>• infrastructure company</li> <li>• time stamp</li> <li>• service</li> </ul>	
<p>Service availability within a geographic block by:</p> <ul style="list-style-type: none"> <li>• service provider</li> <li>• time period</li> </ul>	<p>Data elements:</p> <ul style="list-style-type: none"> <li>• service lat/long</li> <li>• cell tower ID</li> <li>• cell phone type</li> <li>• service company</li> <li>• infrastructure company</li> <li>• time stamp</li> </ul>	<p>Mobile test unit data correlated with performance data across time could expose geographic path of the device or permit uniquely identifying device.</p> <p>Row level statistics of individual users may reveal patterns of use in time periods of raw test results.</p>
<p>Max. speed within a geographic block by:</p> <ul style="list-style-type: none"> <li>• service type</li> <li>• service provider</li> <li>• time period</li> <li>• phone type</li> </ul>	<p>Max speed calculated across time period within geographic block.</p> <p>Data elements:</p> <ul style="list-style-type: none"> <li>• IP performance speed metric</li> <li>• lat/long</li> <li>• cell tower ID</li> <li>• cell phone type</li> <li>• service company</li> <li>• infrastructure company</li> <li>• time stamp</li> <li>• service</li> </ul>	<p>Mobile test unit data correlated with performance data across time could expose geographic path of the device or permit uniquely identifying device.</p> <p>Row level statistics of individual users may reveal patterns of use in time periods of raw test results.</p>
<p>Average jitter within a geographic block by:</p> <ul style="list-style-type: none"> <li>• service type</li> <li>• service provider</li> <li>• time period</li> <li>• phone type</li> </ul>	<p>Average jitter calculated across time period within geographic block.</p> <p>Data elements:</p> <ul style="list-style-type: none"> <li>• IP performance jitter metric</li> <li>• lat/long</li> <li>• cell tower ID</li> <li>• cell phone type</li> <li>• service company</li> <li>• infrastructure company</li> <li>• timestamp</li> <li>• service</li> </ul>	<p>Mobile test unit data correlated with performance data across time could expose geographic path of the device or permit uniquely identifying device.</p> <p>Row level statistics of individual users may reveal patterns of use in time periods of raw test results.</p>

<p>Maximum jitter within a geographic block by:</p> <ul style="list-style-type: none"> <li>• service type</li> <li>• service provider</li> <li>• time period</li> <li>• phone type</li> </ul>	<p>Maximum jitter calculated across time period within geographic block.</p> <p>Data elements:</p> <ul style="list-style-type: none"> <li>• IP performance jitter metric</li> <li>• lat/long</li> <li>• cell tower ID</li> <li>• cell phone type</li> <li>• service company</li> <li>• infrastructure company</li> <li>• timestamp</li> <li>• service</li> </ul>	<p>Mobile test unit data correlated with performance data across time could expose geographic path of the device or permit uniquely identifying device.</p> <p>Row level statistics of individual users may reveal patterns of use in time periods of raw test results.</p>
<p>Internet characteristics by:</p> <ul style="list-style-type: none"> <li>• service type</li> <li>• service provider</li> <li>• geographic block location</li> <li>• time period</li> </ul>	<p>Data elements:</p> <ul style="list-style-type: none"> <li>• IP performance metric</li> <li>• lat/long</li> <li>• cell tower ID</li> <li>• cell phone type</li> <li>• service company</li> <li>• infrastructure company</li> <li>• timestamp</li> <li>• service</li> </ul>	<p>Mobile test unit data correlated with performance data across time could expose geographic path of the device or permit uniquely identifying device.</p> <p>Row level statistics of individual users may reveal patterns of use in time periods of raw test results.</p>
<p>Raw data set (release of all data as collected)</p>	<p>Data elements:</p> <ul style="list-style-type: none"> <li>• {Metric1, Metric2, ...}</li> <li>• lat/long</li> <li>• cell tower ID</li> <li>• cell phone type</li> <li>• service company</li> <li>• infrastructure company</li> <li>• timestamp</li> <li>• service</li> <li>• IP address</li> <li>• Software Instance Identifier</li> </ul>	<p>Raw data affords the finest granularity of information and those poses the greatest privacy concerns. As a result, not all possible data elements may be collected or elements may need to be transformed to address privacy concerns.</p>
<p>Location of Towers by:</p> <ul style="list-style-type: none"> <li>• service type</li> <li>• service provider</li> </ul>	<p>Data elements:</p> <ul style="list-style-type: none"> <li>• lat/long</li> <li>• cell tower ID</li> <li>• RF timing, SNR and signal strength</li> </ul>	<p>GPS locations and RF timing, SNR and signal strength reported by handsets are necessary to identify the lat/long locations of cell towers using multilateration or other engineering technique.</p>

	<ul style="list-style-type: none"> <li>• cell phone type</li> <li>• service company</li> <li>• infrastructure company</li> <li>• service</li> </ul>	
<p>Average latency within a geographic block by:</p> <ul style="list-style-type: none"> <li>• service type</li> <li>• service provider</li> <li>• time period</li> <li>• phone type</li> </ul>	<p>Average latency calculated across time period within geographic block.</p> <p>Data elements:</p> <ul style="list-style-type: none"> <li>• IP performance latency metric</li> <li>• lat/long</li> <li>• cell tower ID</li> <li>• cell phone type</li> <li>• service company</li> <li>• infrastructure company</li> <li>• timestamp</li> <li>• service</li> <li>•</li> </ul>	<p>Mobile test unit data correlated with performance data across time could expose geographic path of the device or permit uniquely identifying device.</p> <p>Row level statistics of individual users may reveal patterns of use in time periods of raw test results.</p>
<p>Maximum latency within a geographic block by:</p> <ul style="list-style-type: none"> <li>• service type</li> <li>• service provider</li> <li>• time period</li> <li>• phone type</li> </ul>	<p>Maximum latency calculated across time period within geographic block.</p> <p>Data elements:</p> <ul style="list-style-type: none"> <li>• IP performance latency metric</li> <li>• lat/long</li> <li>• cell tower ID</li> <li>• cell phone type</li> <li>• service company</li> <li>• infrastructure company</li> <li>• timestamp</li> <li>• service</li> </ul>	<p>Mobile test unit data correlated with performance data across time could expose geographic path of the device or permit uniquely identifying device.</p> <p>Row level statistics of individual users may reveal patterns of use in time periods of raw test results.</p>

It is the intent to formally define each use case, the minimum data elements required to satisfy the use case and ensure that adherence to defined privacy policy is maintained.